ACB-ULTRA.LPCI User Manual

Part Numbers
5104
5104S

SEALEVEL SYSTEMS INCORPORATED

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Introduction

ACB-ULTRA.LPCI

The ACB-ULTRA.LPCI adapter provides the PC with a single channel high-speed multi-protocol serial interface suitable for the most popular communication protocols. This sync/async card provides an ideal solution for high-speed applications including LAN/WAN connectivity. Utilizing the Zilog Z16C32 (IUSC™) on chip DMA controller eliminates bus bandwidth constraints that are placed on typical interface adapters, allowing data rates to reach 10M bps in burst mode. By utilizing the Z16C32's 32 byte FIFO buffer coupled with 256K of on board memory, higher data rates are achieved.

The ACB-ULTRA.LPCI meets the PCISIG size requirements for an MD1 Low Profile adapter. This allows the ACB-ULTRA.LPCI to be used in a variety of modern systems, including low profile servers, network appliances and 'All in One' desktop computers. A standard height bracket is available for implementations in a standard height PCI slot. The ACB-ULTRA.LPCI is a 'Universal Bus' adapter, allowing for use in either +5 or +3.3V PCI slots and provides compliance with the PCISIG PCI Bus Specification Revision 2.2/2.3, which requires ATX power support for both 5V and 3.3V.

Other Sealevel Sync Products

- **PC/104**

ACB-104	(P/N 3512)	- Z85230 RS-232/422/485/530/530a/V.35
ACB-104.ULTRA	(P/N 3514)	- Z16C32 RS-232/422/485/530/530a/V.35

- **Low Profile PCI**

ACB-MP.LPCI	(P/N 5102)	- Z85230 RS-232/422/485/530/530a/V.35
ACB-232.LPCI	(P/N 5103)	- Z85230 RS-232

- **PCI**

ACB-MP.LPCI	(P/N 5102S)	- Z85230 RS-232/422/485/530/530a/V.35
ACB-232.LPCI	(P/N 5103S)	- Z85230 RS-232

- **PCMCIA**

PC-ACB-MP	(P/N 3612)	- Z85233 RS-232/422/485/530/530a/V.35

Before You Get Started

What's Included

The ACB-ULTRA.LPCI is shipped with the following items. If any of these items is missing or damaged please contact Sealevel for replacement.

- **ACB-ULTRA.LPCI Adapter**
  - **5104 includes low profile PCI bracket**
  - **5104S includes standard size PCI bracket**
- **Sealevel Software CD –** with SeaMAC V4 Software & Documentation

Optional Items

Depending upon your application, you are likely to find one or more of the following items useful for interfacing the ACB-ULTRA.LPCI to real-world signals. All items can be purchased from our website (http://www.sealevel.com) or by calling 864-843-4343.

- **CA-178 –** A 6' shielded cable with a DB-25F connector to an ITU-T ISO-2593 style connector (V.35), and converts the Sealevel DB-25 implementation to the ITU-T V.35 mechanical standard.
- **CA-104 –** A 6' extension cable with one DB-25M connector and one DB-25Fconnector, pinned one-to-one, for use with RS-232 and RS-530.
- **CA-107 –** A 10" shielded cabling adapter with a DB-25F (RS-530) to a DB-37M (RS-449 DTE). RS-530 is replacing RS-449 in Telecom applications, but there is still a very large installed base of equipment that still uses the RS-449 pin-out. Both standards use RS-422 to define the electrical specifications and are interchangeable via this adapter cable.
- **CA-159 –** A 6' shielded cable with a DB-25F (RS-530) to a DB-15M (X.21), and converts the standard DB-25 implementation of RS-530 or RS-422 to the ITU-T X.21 standard.

Software Installation

Windows 2000/XP Installation

Do not install the Adapter in the machine until the software has been fully installed.

1. Start Windows.
2. Insert the Sealevel Systems CD in to your CD drive.
3. If 'Auto-Start' is enabled for this drive the software will automatically launch. Otherwise, point your browser to the 'Index.htm' on the root directory of the CD
4. Select 'Install Software'.
5. Select the Part Number for your adapter from the listing.
6. Select 'Windows 98/ME/2000/XP'. The setup file will automatically detect the operating environment and install the proper components. Next (depending on the OS version) select the 'Run this program from its current location' or 'Open' option. Follow the information presented on the screens that follow.
7. A screen may appear with the declaration: "The publisher cannot be determined due to the problems below: Authenticode signature not found." Please select the 'Yes' button and proceed with the installation. This declaration simply means that the Operating System is not aware of the driver being loaded. It will not cause any harm to your system.
8. During setup the user may specify installation directories and other preferred configurations. This program also adds entries to the system registry that are necessary for specifying the operating parameters for each driver. An uninstall option is also included to remove all registry/INI file entries from the system.

Physical Installation

The adapter can be installed in any PCI (5V or 3.3 V) expansion slot.

Do not install the Adapter in the machine until the software has been fully installed.

1. **Turn off power. Disconnect the power cord.**
2. Remove the PC case cover.
3. Locate an available PCI slot and remove the blank metal slot cover.
4. Gently insert the PCI adapter into the slot. Make sure that the adapter is seated properly.
5. Replace the screw. (This is required to ensure FCC Part 15 compliance.)
6. Replace the cover.
7. Connect the power cord and power up the machine.

The ACB-ULTRA.LPCI is now ready for use.

Technical Description

The ACB-ULTRA.LPCI adapter was designed for seamless integration into any PCI based system. The ACB-ULTRA.LPCI adapter requires a PCI slot, one IRQ, an 8 byte block of I/O address and a 16K block or 256K block of memory address and additionally, the IUSC requires a 256 byte block of memory. The memory range of this adapter can be configured to reside in the lower 1 Megabyte memory only or anywhere in upper memory. Low memory (not available on PCI 2.2 or higher systems) must to be configured as 16 X 16K blocks of page memory. High memory can be configured as a 256K linear block or 16K paged memory.

Features

- Single channel high speed sync/async wide area network (WAN) interface
- RS-232, RS-422/449, EIA-530, V.35 and RS-485 serial interface capability with versatile cabling options
- Multi-protocol capable including: PPP (point-to-point protocol), Frame Relay, X.25, high-speed Async, Bi-Sync, Mono-Sync, HDLC, SDLC, etc.
- Ideal for T1, Fractional T1, E1, and ISDN and other WAN applications
- On-board Z16C32 (IUSC™) with built in DMA controller and 32 byte FIFO buffer
- Up to 10 Mbps burst mode
- 256K of on-board RAM
- Link list DMA supported
- 32-bit data path
- OEM Security feature available as an option

Z16C32 IUSC™

The ACB-ULTRA.LPCI is based on a single Zilog Z16C32 IUSC (**I**ntegrated **U**niversal **S**erial **C**ontroller). The IUSC has a built-in DMA controller that allows high-speed data transfers directly to and from the 256K block of on-board memory. The IUSC's built-in DMA controller supports 4 different modes of DMA transfer: Single Buffer, Pipelined, Array, and Link List. An on-board 20MHz oscillator clocks the IUSC.

RAM

The memory window is located by BIOS PCI setup or the Set PCI function. The window size is a 16K paged or 256K linear block. In paged mode the registers are located in the I/O registers.

- Low Memory options: 16 pages of 16K memory blocks totaling 256K (not available on PCI 2.2 or later systems).
- High Memory options: 16 pages of 16K memory blocks totaling 256K or one linear block of 256K memory.

Control and Status Registers Defined

The control and status registers occupy 8 consecutive locations. The following tables provide a functional description of the bit positions.

Address	Mode	D7	D6	D5	D4	D3	D2	D1	D0
Base+0	RD	{0}	{0}	{0}	{1}+	P17	P16	P15	P14
Base+0	WR	ACCEN	MEM/IUC	X	X	P17	P16	P15	P14
Base+1	RD	{0}	{0}	{0}	{0}	{0}	{0}	{0}	{0}
Base+1	WR	X	X	X	X	X	X	X	X
Base+2	RD	LIN/PAGED	{0}	{1}	{0}	{0}	{0}	{0}	{0}
Base+2	WR	LIN/PAGED	X	X	X	X	X	X	X
Base+3	RD	{0}	{0}	INTPEND	RESTAT	{1}	{0}	{0}	{0}
Base+3	WR	SW Board Reset	X	X	X	X	X	X	X
Base+4	RD	{0}	IRQEN	{0}	{0}	{0}	{0}	{0}	{0}
Base+4	WR	X	IRQEN	X	X	X	X	X	X
Base+5	RD	LL	RL	{0}	{0}	M3	M2	M1	M0
Base+5	WR	LL	RL	X	X	M3	M2	M1	M0
Base+6	RD	SD7	SD6	SD5	SD4	SD3	SD2	SD1	SD0
Base+7	RD	SD15	SD14	SD13	SD12	SD11	SD10	SD9	SD8

X = do not care { }= always this value

Control and Status Name Definition

Field	Description
ACCEN	1 = Host access to RAM or IUSC enabled; 0 = Host access to RAM or IUSC disabled. (0 on power-up)
MEM/IUC	1 = Enable Host access to RAM; 0 = Enable Host access to IUSC. (0 on power-up)
P17-P14	These bits select which of sixteen 16K RAM pages is visible at the address selected by MA18-MA14.
IRQEN	1 = Interrupts enabled, 0 = Interrupts disabled. (0 on power-up)
INTPEND	IUSC interrupt status: 1 = No interrupt pending on IUSC; 0 = Interrupt pending on IUSC.
RESTAT	Reset status: 1 = On-board reset inactive; 0 = On-board reset active.
RL	Remote loopback
LL	Local loopback
M0-M3	I/O mode select to SP505 (all 0 on power-up) See Interface Selection table for valid interface options
SD0-SD15	Optional security feature. Unique value per customer or application. (default value = FFFF)
LIN/PAGE	1=256K linear block in high memory only, 0=16X16K pages in low or high memory, (0 on power-up)

Interface Selection

The ACB-ULTRA.LPCI supports a variety of electrical interfaces. Reference the **Control and Status Registers Defined** section of this manual for this bit description. There is line termination on RXD, RXC, and TXC in the following modes: RS-530, RS-530A, RS-485T, and V.35.

Reset Circuit

Writing any value to base+3 will reset the Z16C32. Only one write is required. This starts a reset sequence, which lasts about 320 ns. During the reset sequence base+3 bit D4 will read 0. When the reset is complete, base+3 bit D4 will read 1.

The Z16C32 should not be accessed until the reset sequence is complete.

TSET Clock Select

Port5 of Z16C32 is used to select TSET clock source.

- 0 selects 16C32 TXC as source
- 1 selects received TXC as source

Z16C32 Register Access

Pin	Source
Port0	20 MHz clock
Port1	20 MHz clock
D/C (data/control)	Address SA6
S/D (serial/DMA)	Address SA7
DMA channel registers	Base + 0-127
Serial controller base +	128-255

I/O Signal Derivation

The ACB-ULTRA.LPCI input/output signals are directly generated via the Zilog 16C32 IUSC. The following table defines these signals, their origin pin and signal name following the conventions set by the 16C32 user's manual. If using a Sealevel Systems, Inc. supplied driver, this is for informational use only.

Signal	Source
Transmit Data	16C32 TXD Pin
Request To Send	16C32 Port7 Pin
Data Terminal Ready	16C32 Port6 Pin
Transmit Signal Element Timing	16C32 TXC Pin
Receive Data	16C32 RXC Pin
Clear To Send	16C32 CTS Pin
Data Set Ready	16C32 RXREQ Pin
Data Carrier Detect	16C32 DCD Pin
Transmit Clock	16C32 TXCO Pin
Receive Clock	16C32 RXCO Pin
Ring Indicator	16C32 TXREQ Pin

25 Pin Connector Signal Layouts (DB-25 Male)

In all modes, Pin 1 has a 1K ohm resistor to GND and pin 25 has a 1K ohm resistor to +5V connection. This is useful for RS-485 biasing. If this presents a problem in your implementation, please contact Sealevel Systems' Technical Support for aid in removing.

RS-232 Signals

Base+5, M3-M0=2, 0010

Pin #	Signal	Name	Mode
2	TD	Transmit Data	Output
3	RD	Receive Data	Input
4	RTS	Request To Send	Output
5	CTS	Clear To Send	Input
6	DSR	Data Set Ready	Input
7	GND	Ground	
8	DCD	Data Carrier Detect	Input
15	TXC	Transmit Clock	Input
17	RXC	Receive Clock	Input
18	LL	Local Loopback	Output
20	DTR	Data Terminal Ready	Output
21	RL	Remote Loopback	Output
22	RI	Ring Indicator	Input
24	TSET	Transmit Signal Element Timing	Output
25	TM	Test Mode	Input

RS-485 or RS-485T

Base+5, M3-M0=4, 0100 (With termination)
Base+5, M3-M0=5, 0101 (Without termination)

Pin #	Signal	Name	Mode
2	TDA TX–	Transmit Negative	Output
3	RDA RX–	Receive Negative	Input
7	GND	Ground	
9	RXCB RXC+	Receive Clock Positive	Input
11	TSETB TSET+	Transmit Signal Element Timing +	Output
12	TXCB TXC+	Transmit Clock Positive	Input
14	TDB TX+	Transmit Positive	Output
15	TXCA TXC–	Transmit Clock Negative	Input
16	RDB RX+	Receive Positive	Input
17	RXCA RXC–	Receive Clock Negative	Input
18	LL	Local Loopback	Output
20	DTRA DTR–	Data Terminal Ready Negative	Output
21	RL	Remote Loopback	Output
23	DTRB DTR+	Data Terminal Ready Positive	Output
24	TSETA TSET–	Transmit Signal Element Timing –	Output

Note: The RX+/- lines do not have pull up or pull down biasing. For high baud rates or long distances, add 1K Ω resistor from RX- to GND, and add 820 Ω resistor from RX+ to +5V DTR (depending on state of DTR in application – do not toggle DTR).

RS-530 (RS-422)

Base+5, M3-M0=D, 1101

Pin #	Signal	Name	Mode
2	TDA TX–	Transmit Negative	Output
3	RDA RX–	Receive Negative	Input
4	RTSA RTS–	Request To Send Negative	Output
5	CTSA CTS–	Clear To Send Negative	Input
6	DSRA DSR–	Data Set Ready Negative	Input
7	GND	Ground	
8	DCDA DCD–	Data Carrier Detect Negative	Input
9	RXCB RXC+	Receive Clock Positive	Input
10	DCDB DCD+	Data Carrier Detect Positive	Input
11	TSETB TSET+	Transmit Signal Element Timing +	Output
12	TXCB TXC+	Transmit Clock Positive	Input
13	CTSB CTS+	Clear To Send Positive	Input
14	TDB TX+	Transmit Positive	Output
15	TXCA TXC–	Transmit Clock Negative	Input
16	RDB RX+	Receive Positive	Input
17	RXCA RXC–	Receive Clock Negative	Input
19	RTSB RTS+	Request To Send Positive	Output
20	DTRA DTR–	Data Terminal Ready Negative	Output
22	DSRB DSR+	Data Set Ready Positive	Input
23	DTRB DTR+	Data Terminal Ready Positive	Output
24	TSETA TSET–	Transmit Signal Element Timing –	Output

RS-530A

Base+5, M3-M0=F, 1111

Pin #	Signal	Name	Mode
2	TDA TX–	Transmit Negative	Output
3	RDA RX–	Receive Negative	Input
4	RTSA RTS–	Request To Send Negative	Output
5	CTSA CTS–	Clear To Send Negative	Input
6	DSRA DSR–	Data Set Ready Negative	Input
7	GND	Ground	
8	DCDA DCD–	Data Carrier Detect Negative	Input
9	RXCB RXC+	Receive Clock Positive	Input
10	DCDB DCD+	Data Carrier Detect Positive	Input
11	TSETB TSET+	Transmit Signal Element Timing +	Output
12	TXCB TXC+	Transmit Clock Positive	Input
13	CTSB CTS+	Clear To Send Positive	Input
14	TDB TX+	Transmit Positive	Output
15	TXCA TXC–	Transmit Clock Negative	Input
16	RDB RX+	Receive Positive	Input
17	RXCA RXC–	Receive Clock Negative	Input
18	LL	Local Loopback	Output
19	RTSB RTS+	Request To Send Positive	Output
20	DTRA DTR–	Data Terminal Ready Negative	Output
21	RL	Remote Loopback	Output
24	TSETA TSET–	Transmit Signal Element Timing –	Output

V.35 Signals

Base+5, M3-M0=E, 1110

Pin #	Signal	Name	V.35	Mode
2	TDA TX–	Transmit Negative	P	Output
3	RDA RX–	Receive Negative	R	Input
4	RTS	Request To Send	C	Output *
5	CTS	Clear To Send	D	Input *
6	DSR	Data Set Ready	E	Input *
7	GND	Ground	B	
8	DCD	Data Carrier Detect	F	Input *
9	RXCB RXC+	Receive Clock Positive	X	Input
11	TSETB TSET+	Transmit Signal Element Timing +	W	Output
12	TXCB TXC+	Transmit Clock Positive	AA	Input
14	TDB TX+	Transmit Positive	S	Output
15	TXCA TXC–	Transmit Clock Negative	Y	Input
16	RDB RX+	Receive Positive	T	Input
17	RXCA RXC–	Receive Clock Negative	V	Input
18	LL	Local Loopback		Output *
20	DTR	Data Terminal Ready	H	Output *
21	RL	Remote Loopback		Output *
22	RI	Ring Indicator	J	Input *
24	TSETA TSET–	Transmit Signal Element Timing –	U	Output

Note: All modem control signals are single ended (un-balanced) with RS-232 signal levels.
***Technical Note*:** Please terminate any control signals that are not going to be used. The most common way to do this is connect RTS to CTS and RI. Also, connect DCD to DTR and DSR. Terminating these pins, if not used, will help insure you get the best performance from your adapter.

Specifications

Environmental Specifications

Specification	Operating	Storage
Temperature Range	0º to 70º C (32º to 158º F)	-50º to 105º C (-58º to 221º F)
Humidity Range	10 to 90% R.H. Non-Condensing	10 to 90% R.H. Non-Condensing

Manufacturing

All Sealevel Systems Printed Circuit boards are built to UL 94V0 rating and are 100% electrically tested. These printed circuit boards are solder mask over bare copper or solder mask over tin nickel.

Power Consumption

Supply line	+3.3VDC	+5 VDC
Rating	350 mA	100mA

Physical Dimensions

Board length	4.721 inches	(11.991 cm)
Board Height including Goldfingers	2.536 inches	(6.441 cm)

Appendix A – Troubleshooting

Following these simple steps can eliminate most common problems.

1. Read this manual thoroughly before attempting to install the adapter in your system.
2. **Install software first**. This places the required installation files in the correct locations. After installing the software, proceed to the physical installation section of this manual.
3. Make sure the Sealevel Systems adapter is securely installed.
4. Identify all I/O adapters currently installed in your system. This includes your on-board serial ports, controller cards, sound cards, etc. The I/O addresses used by these adapters, as well as the IRQ (if any) should be identified.
5. Configure your Sealevel Systems adapter so that there is no conflict with currently installed adapters. No two adapters can occupy the same I/O address.
6. Try the Sealevel Systems adapter with a unique IRQ. While the Sealevel Systems adapter does allow the sharing of IRQs, many other adapters (i.e., SCSI adapters and on-board serial ports) do not.
7. For Windows 2000/XP, the diagnostic tool 'WinSSD' is installed the SeaMAC folder on the Start Menu during the setup process. First find the ports using the Device Manager, then use 'WinSSD' to verify that the ports are functional.
8. Always use Sealevel Systems diagnostic software when troubleshooting a problem. This will eliminate any software issues from the equation.

If these steps do not solve your problem, please call Sealevel Systems' Technical Support, (864) 843-4343. Our technical support is free and available from 8:00AM-5PM Eastern Time, Monday through Friday. For email support contact: mailto:support@sealevel.com.

Appendix B - How To Get Assistance

When calling for technical assistance, please have your user manual and current device settings ready. If possible, please have the device installed and ready to run diagnostics.

Sealevel Systems maintains a website on the Internet. Our homepage address is http://www.sealevel.com. The latest software updates and newest manuals are available via our FTP site that can be accessed from our home page. Manuals and software can also be downloaded from the product page for your device.

Sealevel Systems provides an FAQ section on our website. Please refer to this to answer many common questions. This section can be found at http://www.sealevel.com/faq.asp

Technical support is available Monday to Friday from 8:00 a.m. to 5:00 p.m. eastern time (UTC-6 hours). You can contact Technical Support via:

Phone: (864) 843-4343

Email: support@sealevel.com

Appendix C – Electrical Interface

RS-232

Quite possibly the most widely used communication standard is RS-232. This implementation has been defined and revised several times and is often referred to as RS-232 or EIA/TIA-232. It is defined by the EIA as the Interface between Data Terminal Equipment and Data Circuit- Terminating Equipment Employing Serial Binary Data Interchange. The mechanical implementation of RS-232 is on a 25 pin D sub connector. RS-232 is capable of operating at data rates up to 20 Kbps at distances less than 50 ft. The absolute maximum data rate may vary due to line conditions and cable lengths. RS-232 often operates at 38.4 Kbps over very short distances. The voltage levels defined by RS-232 range from -12 to +12 volts. RS-232 is a single ended or unbalanced interface, meaning that a single electrical signal is compared to a common signal (ground) to determine binary logic states. A voltage of +12 volts (usually +3 to +10 volts) represents a binary 0 (space) and -12 volts (-3 to -10 volts) denotes a binary 1 (mark). The RS-232 and the EIA/TIA-574 specification defines two type of interface circuits, Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE). The Sealevel Systems adapter is a DTE interface.

RS-422

The RS-422 specification defines the electrical characteristics of balanced voltage digital interface circuits. RS-422 is a differential interface that defines voltage levels and driver/receiver electrical specifications. On a differential interface, logic levels are defined by the difference in voltage between a pair of outputs or inputs. In contrast, a single ended interface, for example RS-232, defines the logic levels as the difference in voltage between a single signal and a common ground connection. Differential interfaces are typically more immune to noise or voltage spikes that may occur on the communication lines. Differential interfaces also have greater drive capabilities that allow for longer cable lengths. RS-422 is rated up to 10 Megabits per second and can have cabling 4000 feet long. RS-422 also defines driver and receiver electrical characteristics that will allow 1 driver and up to 32 receivers on the line at once. RS-422 signal levels range from 0 to +5 volts. RS-422 does not define a physical connector.

RS-485

RS-485 is backwardly compatible with RS-422; however, it is optimized for partyline or multi-drop applications. The output of the RS-422/485 driver is capable of being Active (enabled) or Tri-State (disabled). This capability allows multiple ports to be connected in a multi-drop bus and selectively polled. RS-485 allows cable lengths up to 4000 feet and data rates up to 10 Megabits per second. The signal levels for RS-485 are the same as those defined by RS-422. RS-485 has electrical characteristics that allow for 32 drivers and 32 receivers to be connected to one line. This interface is ideal for multi-drop or network environments. RS-485 tri-state driver (not dual-state) will allow the electrical presence of the driver to be removed from the line. Only one driver may be active at a time and the other driver(s) must be tri-stated. RS-485 can be cabled in two ways, two wire and four wire mode. Two wire mode does not allow for full duplex communication, and requires that data be transferred in only one direction at a time. For half-duplex operation, the two transmit pins should be connected to the two receive pins (Tx+ to Rx+ and Tx- to Rx-). Four wire mode allows full duplex data transfers. RS-485 does not define a connector pin-out or a set of modem control signals. RS-485 does not define a physical connector.

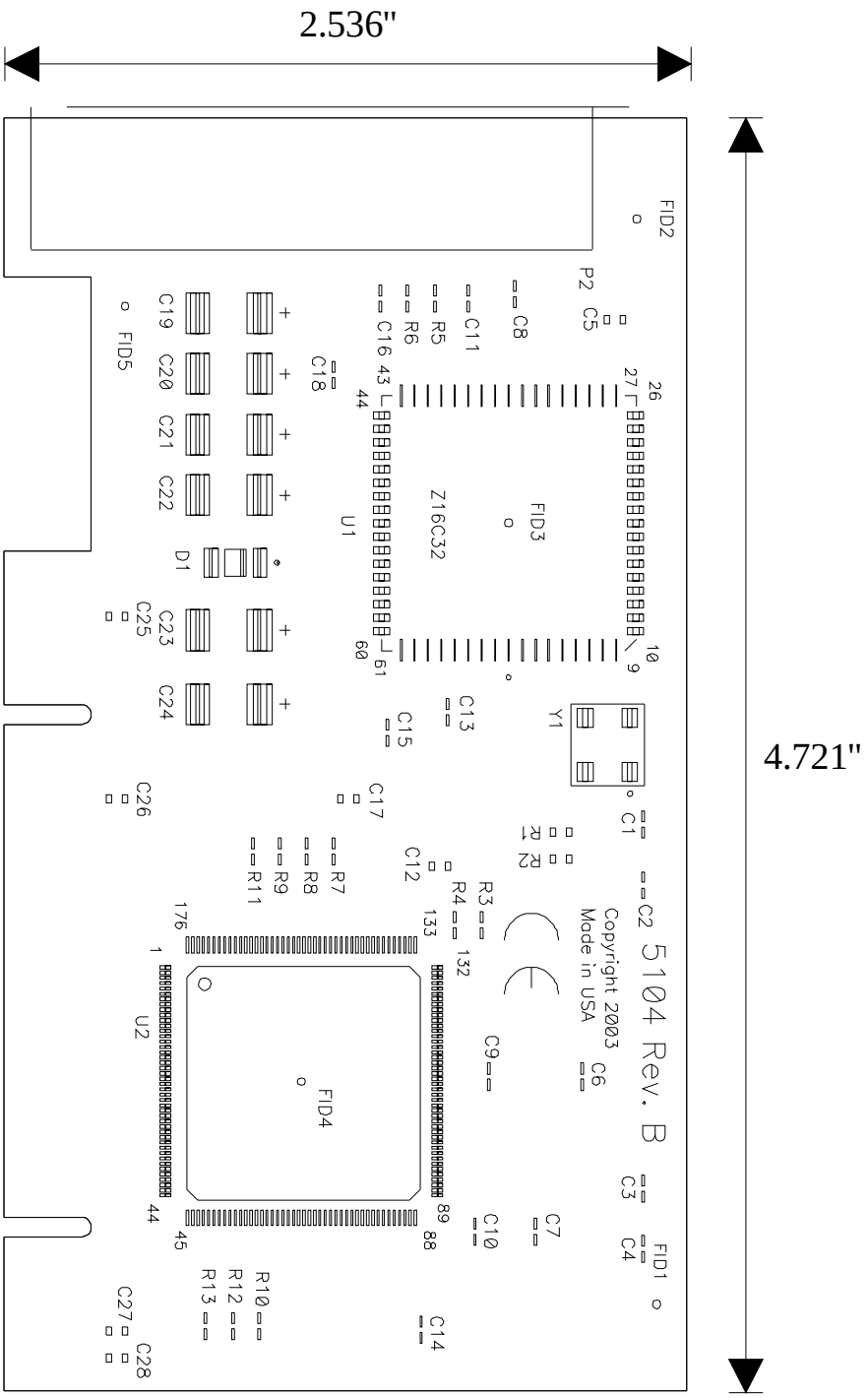
RS-530 / 530A

RS-530 (a.k.a. EIA-530) compatibility means that RS-422 signal levels are met, and the pin-out for the DB-25 connector is specified. The EIA (Electronic Industry Association) created the RS-530 specification to detail the pin-out, and define a full set of modem control signals that can be used for regulating flow control and line status. The major difference between RS-530 and RS-530A lies in some of the modem control interface signals. In RS-530 the signals all of the modem control signals are differential, in RS-530A some of these signals are single ended. The RS-530 specification defines two types of interface circuits, Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE). The Sealevel Systems adapter is a DTE interface.

V.35

V.35 is a standard defined by ITU (formerly CCITT) that specifies an electrical, mechanical, and physical interface that is used extensively by high-speed digital carriers such as AT&T Dataphone Digital Service (DDS). ITU V.35 is an international standard that is often refereed to as Data Transmission at 48 Kbps Using 60 - 108 KHz Group-Band Circuits. ITU V.35 electrical characteristics are a combination of unbalanced voltage and balanced current mode signals. Data and clock signals are balanced current mode circuits. These circuits typically have voltage levels from 0.5 Volts to -0.5 Volts (1 Volt differential). The modem control signals are unbalanced signals and are compatible with RS-232. The physical connector is a 34 pin connector that supports 24 data, clock and control signals. The physical connector is defined in the ISO-2593 standard. ITU V.35 specification defines two type of interface circuits, Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE). The Sealevel Systems adapter is a DTE interface.

Appendix D – Silk Screen – 5104 PCB



Appendix E - Compliance Notices

Federal Communications Commission Statement

FCC - This equipment has been tested and found to comply with the limits for Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in such case the user will be required to correct the interference at the user's expense.

EMC Directive Statement

CE

Products bearing the CE Label fulfill the requirements of the EMC directive (89/336/EEC) and of the low-voltage directive (73/23/EEC) issued by the European Commission.

To obey these directives, the following European standards must be met:

EN55022 Class A - "Limits and methods of measurement of radio interference characteristics of information technology equipment"

EN55024 – "Information technology equipment Immunity characteristics Limits and methods of measurement".

EN60950 (IEC950) - "Safety of information technology equipment, including electrical business equipment"

Warning

This is a Class A Product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures to prevent or correct the interference.

Always use cabling provided with this product if possible. If no cable is provided or if an alternate cable is required, use high quality shielded cabling to maintain compliance with FCC/EMC directives.

Warranty

Sealevel's commitment to providing the best I/O solutions is reflected in the Lifetime Warranty that is standard on all Sealevel manufactured products. We are able to offer this warranty due to our control of manufacturing quality and the historically high reliability of our products in the field. Sealevel products are designed and manufactured at its Liberty, South Carolina facility, allowing direct control over product development, production, burn-in and testing.

Sealevel Systems, Inc. (hereafter "Sealevel") warrants that the Product shall conform to and perform in accordance with published technical specifications and shall be free of defects in materials and workmanship for life. In the event of failure, Sealevel will repair or replace the product at Sealevel's sole discretion. Failures resulting from misapplication or misuse of the Product, failure to adhere to any specifications or instructions, or failure resulting from neglect or abuse are not covered under this warranty. Warranty service is obtained by delivering the Product to Sealevel and providing proof of purchase.

NOTE: **Return authorization must be obtained from Sealevel Systems before returned merchandise will be accepted. Authorization is obtained by calling Sealevel Systems and requesting a Return Merchandise Authorization (RMA) number.**

The Customer agrees to insure the Product or assume the risk of loss or damage in transit, to prepay shipping charges to Sealevel, and to use the original shipping container or equivalent. Warranty is valid only for original purchaser and is not transferable.

Sealevel Systems assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, or inability to use this product. Sealevel Systems will not be liable for any claim made by any other related party.

This warranty applies to Sealevel manufactured Product. Product purchased through Sealevel but manufactured by a third party will retain the original manufacturer's warranty.

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Technical Support is available Monday - Friday from 8 a.m. to 5 p.m. Eastern time.

Trademarks

Sealevel Systems, Incorporated acknowledges that all trademarks referenced in this manual are the service mark, trademark, or registered trademark of the respective company.